

begin

REEL #139

FUKS, M.F.
to

SUBJECT

USSR / PHYSICS

CARD 1 / 2

PA - 1470

AUTHOR

FUKS, M.F., ATACHODZAEV, A.K.

TITLE

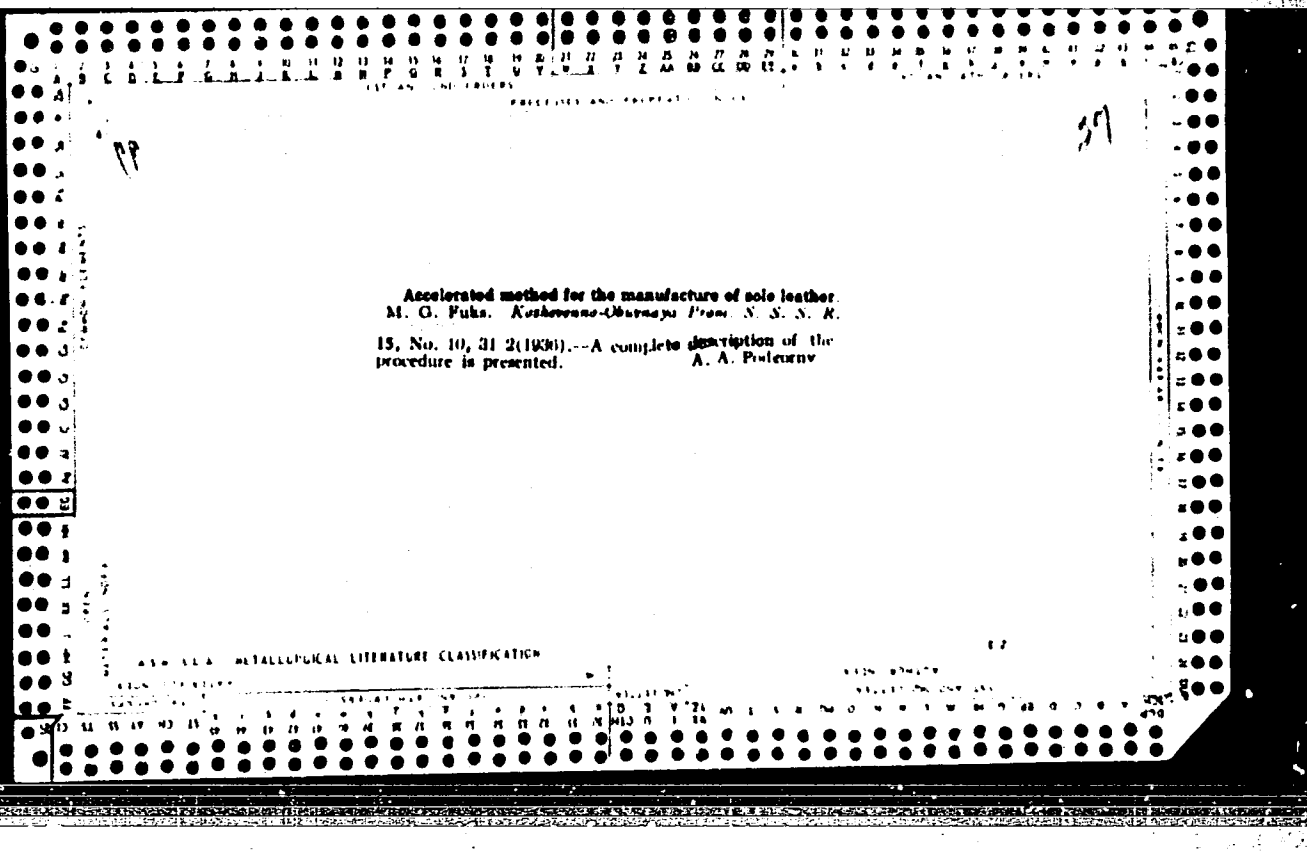
The Determination of the Time of the Orientation-Relaxation of Some Liquids from the Width of the Scattering Line.

PERIODICAL

Dokl. Akad. Nauk, 109, fasc. 5, 926-928 (1956)

Issued: 10 / 1956 reviewed: 11 / 1956

The present work investigates the distant ranges of the wing (edge?) of the line by means of the usual photographic photometrization. The three mercury lines 4358; 4347 and 4339 Å served as a standard of intensity. In the case of the normal operation of the lamp used here the ratios of the intensities of these three lines were 1 : 1/18 : 1/58. The breadths of the lines of the direct and of the scattered light were measured by means of a comparator at three points, viz. where intensity diminishes by the 3, 2-, 18-, and 58-fold respectively. (This corresponds to the width of the second line at the level of the third, to that of the first at the level of the second, and to that of the first line at the level of the third respectively). $1/n = 1/(1 + \tau^2 (2\pi \Delta \nu_n)^2)$ or $\tau = \sqrt{n-1} / 2\pi \Delta \nu_n$ is found. Here $\Delta \nu_n$ denotes the true half width of the scattering line at the point where intensity decreases by the n-fold as against the middle of the line. The last mentioned formula forms the basis of the formula mentioned here for the determination of τ . In connection with these experiments $n = 3, 2; 18$ and 58 . If in the liquid under investigation the processes take place with only one single relaxation time, the three half width $\Delta \nu_{3,2}$, $\Delta \nu_{18}$ and $\Delta \nu_{58}$ must lead to the same value of τ . (The



[illegible]

17

CA

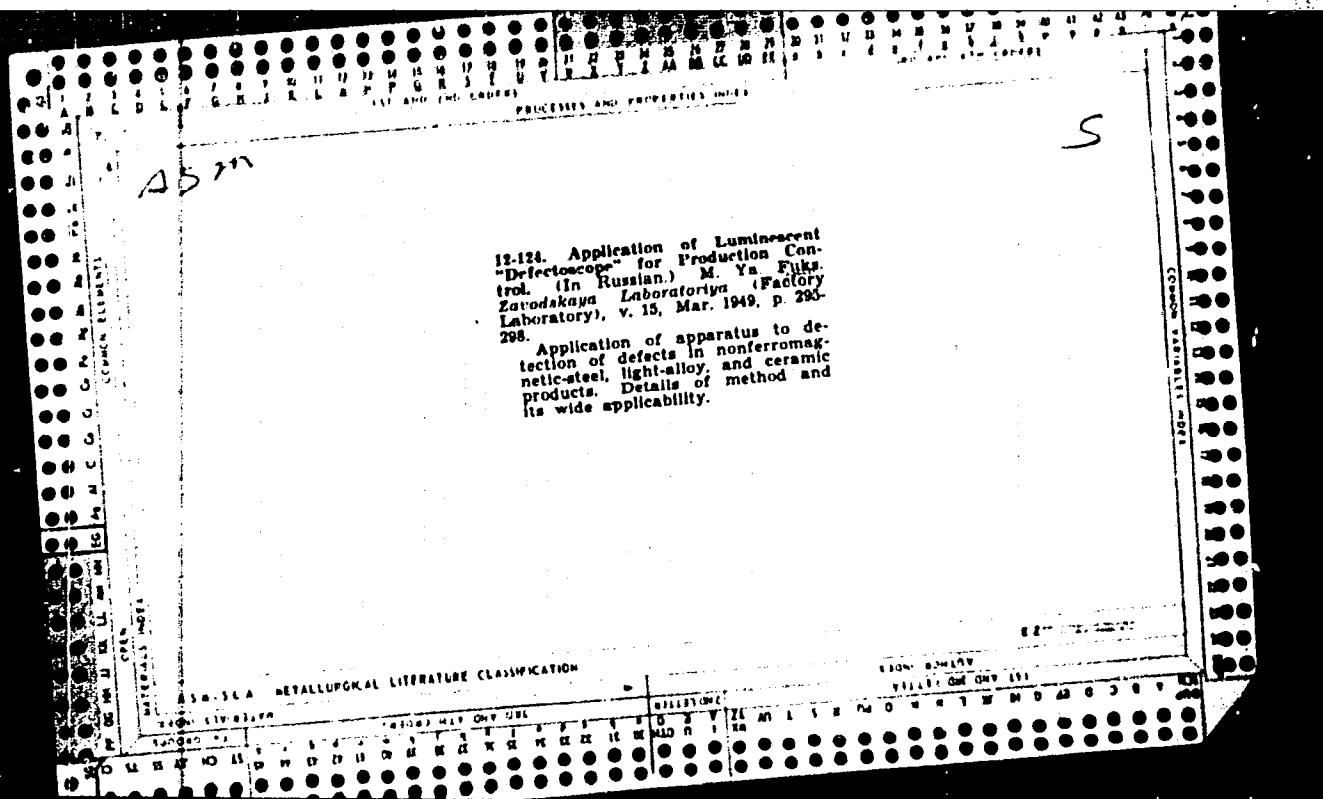
A comparative evaluation of methods for the determination of anabesine. M. G. Futs, *Lab. Forsch.* (U. S. S. R.) 16, No. 9, 33-9 (1941).—The fluoridate method for anabesine is affected by the presence of small quantities of ptomaines, amino acids, traces of proteins and fats. The colorimetric detn. is affected by pyridine, nicotine or other org. compds. possessing the pyridine ring. The acetylation method is more accurate, because none of these substances is acetylated. Seven references. W. R. Hess

137 AND 138 GROUPS										139 AND 140 GROUPS									
COMMON ELEMENTS																			
COMMON VALUABLE METALS																			
<p>CA</p>										<p>17</p>									
<p>Microchemical reactions of anabasine. M. (V. Pukh (Odessa Inst. Sci. Exam.). <i>J. Applied Chem. (U.S.S.R.)</i> 19, 102-4 (1946); cf. C.A. 39, 10171. - Four new microchem. reactions for pptg. anabasine were found; the reagents are: BaCl_2, $\text{NiSO}_4 \cdot 6\text{H}_2\text{O}$, $\text{K}_2\text{Cr}_2\text{O}_7$, and $\text{K}_2\text{Pt}(\text{CNS})_6$ in dil. acid soln. The last two reagents show sensitivities of 1:200,000 and 1:1,000,000 resp. The tests are characteristic, and other alkaloids do not interfere. G. M. Kosolapoff</p>																			
<p>ASH-SLA METALLURGICAL LITERATURE CLASSIFICATION</p>																			
FROM SYNTHESE										FROM SCHLAF									
<p>GROUPS</p>										<p>GROUPS</p>									

FUKS, M.I.; GINIS, R.P.

Tasks of the laboratory for analytical control. Apt. Jelo. 4 no.6:
43-47 N-D '55. (MIRA 9:1)

1. Iz Chernigovskoy kontrol'no-analiticheskoy laboratorii.
(PHARMACY,
laboratories for analytical control)



FUKS, M. IA.

M. Ia. Fuks and S. S. D'iachenko. X-ray investigation of cold hardening at abrasive and high speed grinding of steel. P. 106

Khar'kov turbo-
generator Plant

Discussion of above paper. P. 113

SO: Bulletin of the Acad. of Sciences, Izvestia (USSR) Series on Phys.
Vol. 15, No. 1 (1951)

Fuks, M. Ya.

Distr: 4243

Scale for quantitative phase determination in the nitro-
layer by x-ray method. M. Ya. Fuks and E. V. Ajneson.
Zavodskaya (ab. 29, No. 8, 641-642, 1964). Refer. Zhur.,
Khim. 1965, Abstr. No. 55979. -- A method is given by
which it is possible by x-ray structure analysis to det. the
type and concn. of the α , β , and γ phases in the nitro-
layer. For their determination, it is necessary to draw scales by
superimposing and comparing with the analytical calen. the
intensity of interference max. The concn. of phases is
established by comparing the integral intensity of the lines
of two phases, assuming the concn. of one of the phases as
unity. N. Vasiloff

FUKS, M. Ya.

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Röntgenographic investigation of nitrided layer of carbon and alloy steels. M. Ya. Fuchs and E. V. Aronson. Zhur. Tekh. Fiz. 24, 1438-54 (1954). By low-temp. nitriding (500-600°) of C steel a fairly intense satn. by N_2 results in the formation of the ϵ -phase. In a thin surface zone a homogeneous structure of ϵ - or γ -phase was röntgenographically ob-

served even though the hardness from the surface exceeded interior hardness by 100-160 Hp. 5. Hardness of Fe_3N phases is not high. In nitrided alloy steels of 5 kinds investigated the concn. of ϵ -phase (Fe_4N) in the surface zone was always less than in C steels, even though the hardness was considerably higher. It was noted that Si in steel affected the hardness and depth of diffusion of nitride phases analogous to Al but to a lesser degree. Hardness of nitrided layer on steels alloyed with Cr, Mo, and V depends on ϵ -phase while on steels alloyed with Al or Si on nitride phase. X-ray data on the amt. of ϵ -phase, the parameters of its lattice on width of lines on röntgenograms speak for the hypothesis of the formation of finely dispersed nitrides of alloying elements disturbing the coherence in crystals of Fe_3N and phase and, therefore, markedly raising their hardness. This is especially true for AlN.

V. N. Belnarski

of *Small* ①

GAVRANEK, V.V.; FUKS, M.Ya.; BOL'SHUTKIN, D.N.

X-ray analysis of cavitation erosion in metals. Fiz.met. i
metalloved. 1 no.3:494-499 '55. (MLRA 9:6)

L.Khar'kovskiy politekhnicheskoy institut imeni V.I.Lenina.
(Cavitation) (Metallography)

Fuks, M. Ya.

USSR/ Engineering - Turbine testing

Card 1/1 Pub. 128 - 6/28

Authors : Fuks, M. Ya., Cand. of Phys.-Math. Sc.; and Glasyuk, I. K., Eng.

Title : Deflection of turbine shafts and rotors during heat tests

Periodical : Vest. mash. 35/6, 30 - 34, Jun 1955

Abstract : Results of tests and experiments conducted for the past several years on the causes and characteristics of deflection of turbine shafts and rotors in a heated state, are presented. Individual experiments, types of steels used and temperatures, and the magnitude and characteristics of deflections, are described. Three references: 2 USSR and 1 USA (1941-1947). Drawing; graphs.

Institution :

Submitted :

FUKS, M. YA.

Category : USSR/Solid State Physics - Structure of Deformable Materials.

E-8

Abs Jour : Ref Zhur - Fizika, No 3, 1957, No 6733

Author : Fuchs, M. Ya., Slonovskiy, N. V., Lupilov, L. I.

Inst : Khar'kov Turbine Plant, USSR

Title : X-ray Diffraction Investigation of the Phenomena that Accompany the Prolonged Stretching of Steel at High Temperature.

Orig Pub : Fiz. metallov i metallovedeniye, 1956, 2, No 2, 328-338

Abstract : From the broadening of the lines on the X-ray diffraction patterns, an estimate was made of the degree of crumbling of the coherent regions and the magnitude of the macro stresses in 20 and 35 KhNM steel, deformed by tension at 20, 300, 500 and 600°. The duration of the deformation changed from several minutes to 100 hours. When stretching at a speed of approximately 4% of the ultimate elongation per minute, at 20, 300, and 500°, the blocks become pulverized and micro stresses occur; at 600° these processes occur less intensely, but quite noticeable even in carbon steel. After deformation

Card : 1/2

Fuks, M. Ya.

USSR/Solid State Physics - Structure of Deformable Materials.

E-9

Abs Jour : Referat Zhur - Fizika, No 5, 1957, 11857

Author : Fuks, M.Ya., Slonovskiy, N.V., Lupilov, L.I.

Inst : -

Title : X-ray Diffraction Investigation of Phenomena Accompanying
Prolonged Tension of Steel at Higher Temperatures.

Orig Pub : Izv. AN SSSR, ser. fiz., 1956, 20, No 6, 671-675

Abstract : Brief summary of an article by the authors, published in
the Journal "Fizika metallov i metallovedeniye" 1956, 2,
No 2, 328-338, (Referat Zhur Fizika, 1957, 6733).

Kharkov turbine plant in S.M. Kirov

Card 1/1

FUKS, M. Ya.

USSR / Structure of Deformed Materials.

E-8

Abs Jour : Ref Zhur - Fizika, No 4, 1957, No 9393

Author : Fuks, M. Ya., Dobrovol'skaya, G.V.

Inst : Khar'kov Polytechnic Institute, USSR

Title : Effect of Texture on the Intensity of the Interference Lines
in the Investigation of Bulky Deformed Specimens.

Orig Pub : Izv. AN SSSR, ser. fiz., 1956, 20, No 6, 679-683

Abstract : An investigation was made of the change in the absolute and relative intensities of the lines in the X-ray photography of specimens of chrome-nickel-molybdenum steel, subjected to plastic tension at 20 and 500°. According to the theory, the effect of the texture of the deformation on the above intensity is so considerable in the investigation of bulky specimens, and depends so much on the conditions under which the photographs are made, that the results of such investigations are extremely multiply-valued and cannot be

Card : 1/2

USSR / Structure of Deformed materials.

E-8

Abs Jour : Ref Zhur - Fizika, No 4, 1957, No 9393

Abstract : used for the estimate of the values of the microdistortions of the lattice. Lines with different indices change their intensity in a different manner and even in opposite directions. Comparison of lines of different orders from the parallel planes does not eliminate the effect of the texture. It is possible to test for the influence of the texture in measurements of the line intensities by taking X-ray photographs at various angles of inclination of the specimen relative to the primary beam; if the effect of the texture is insignificant, the intensity will change only in accordance with the absorption factor. An index for the reliability of the results concerning the reduction in the intensity of the X-ray interference lines by microdistortions can be the conservation of the monotonic course of the f -curve, experimentally obtained from several lines over a wide range of angles of reflection.

Card : 2/2

FUKS, M.Ya.; GERMAN, S.I.

Measuring residual stresses in large weldments by the electrotenso-
metric method. Zav. lab. 23 no.3:346-349 '57. (MIRA 10:6)

1. Khar'kovskiy turbinnyy zavod im. S.M. Kirova.
(Strains and stresses--Measurement) (Welding--Testing)

AUTHORS: Fuks, M. Ya. and Gol'dshteyn, L. Ya. SOV/126-6-3-18/32
 TITLE: X-ray Microbeam Studies of Undeformed Steel. I
 (Issledovaniye nedeformirovannoy stali s pomoshch'yu
 rentgenovskikh mikropuchkov. I)
 PERIODICAL: Fizika Metallov i Metallovedeniye, 1958. Vol 6, Nr 3,
 pp 512-516 (USSR)
 ABSTRACT: A special source tube with a focal spot diameter of
 0.15 mm and a beam current of 1 mA. The beam is stopped
 down using circular holes of 40 μ diameter (or larger)
 in Ta sheet; back-reflection methods are used. Fig.1
 shows certain details of the stop- and cassette-holder;
 two films one behind the other are used, to give the
 best results. Fe and Cc anodes are used; the areas
 covered by the beam range from 70 to 130 μ in diameter
 (70 μ is enough to encompass only 2-3 crystals with the
 steel used). Medium-carbon steel type 25 is used,
 normalized at 860-870°C and annealed at 620-630°C
 (3 hours). Fig.2 shows the pattern from the undeformed
 steel (x 2); the intense spots fall up to 35' away from
 the K_{α_1} and K_{α_2} rings. The spots are not duplicated.

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X-ray Microbeam Studies of Undeformed Steel. I SOV/126-6-3-18/32

Fig.3 shows (inter alia) microphotometer traces of radially and tangentially split spots; it is concluded that the individual crystals in fact consist of several pieces of very slightly differing orientations, (which are not the mosaic blocks, because they are themselves nonuniform) but very closely similar lattice parameters. There are 3 figures and 7 references, 3 of which are Soviet, 4 English.

ASSOCIATION: Khar'kovskiy politekhnicheskii institut imeni
V. I. Lenina (Khar'kov Polytechnical Institute imeni
V. I. Lenin)

SUBMITTED: July 20, 1956 (initially); November 26, 1956 (after
revision)

1. Steel--Microstructure
2. X-ray diffraction analysis--Applications
3. X-ray diffraction analysis--Equipment
4. Crystals--Lattices

Card 2/2

NOV/126-4-13/34

AUTHOR: Fuks, M.Ya.
Gol'dshteyn, L.Ya.

TITLE: X-Ray Investigation of Deformed Steel by Means of
Micro-Beams. Part II (Rentgenograficheskoye issledovaniye
deformirovannoy stali s pomoshch'yu mikropuchkov. II)

PERIODICAL: Fizika Metallov i Metallovedeniye, 1958, Vol 6,
Nr 4, pp 673-681 (USSR)

ABSTRACT: Use of narrow "micro-beams" of X-rays is very promising
from the point of view of studying plastically deformed
metals, since they enable obtaining important new
information on the deformation of individual crystallites.
In this paper some of the results are described which
were obtained in investigations by means of this method
of carbon steels which were subjected to tension at
various speeds. The specimens made of the carbon steel
25 were subjected to normalisation annealing at
860-870°C and tempering at 620 to 630°C with subsequent
slow cooling. From these, standard specimens were
prepared for long duration tensile tests. According to
earlier work of the authors (Ref 1), the average linear

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30V/1266-4-15/34

X-Ray Investigation of Deformed Steel by Means of Micro-beams.
Part II.

dimension of the crystallites in the non-deformed state equals 2.5×10^{-2} mm. Specimens were investigated after fracture in long as well as in short duration tensile tests; the test conditions and the results are entered in a table, p 675. The method of X-ray analysis was the same as that described in earlier work (Ref.1). The X-ray exposures were taken from sections of the specimens with residual elongations of 6.15 and 40%. The surface of the specimens was first etched to a depth of 0.3 mm for the purpose of eliminating the layer which became work hardened during machining. The majority of the exposures were obtained by means of iron radiation with the direction of the primary beam perpendicular to the direction of the deformation of the specimen (i.e. perpendicular to the specimen axis); the interference pattern from the plane (220) was investigated. The diameter of the irradiated section amounted to 60-70 μ or 120 μ in the case of a convergence of the primary beam of

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SOV/126-6-4-15/34

X-Ray Investigation of Deformed Steel by Means of Micro-Beams.
Part II.

1.9×10^{-3} to 25×10^{-3} rad. The exposure time was 30 to 40 hours. A common feature of all the X-ray diffraction pictures of the deformed specimens, obtained by the micro-beam method, is that instead of single sharply defined spots, which are characteristic for non-deformed specimens, separate arcs were observed, Fig.1. These arcs consist of groups of more or less pronounced individual spots or continuous black lines. The regularity of distribution of the spots in the arc (slight displacement of the spots in the radial direction), which was observed in a number of cases, indicates that adjacent spots in the arcs correspond to adjacent fragments or at least fragments which are very near to each other. Therefore, the magnitude of angular deorientation calculated from the angle between adjacent spots in the arc characterises the degree of deorientation of the fragments in the crystallite. Results are given for the following conditions of experiment: fracture by tensile stresses applied for 137 hours at 450°C ; fracture by tensile stresses at 450°C applied for 15.5 hours; fracture by tensile stresses at 450°C applied for a

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SOV/126-6-4-15/34

X-Ray Investigation of Deformed Steel by Means of Micro-Beams.
Part II.

duration of 3 mins; fracture of a specimen after deformation in the cold state; investigation of the influence of the texture; long duration stressing of the steel 35K₁NM (at 500°C). The conclusions of the authors can be summarised thus:

1. It is shown that it is possible to apply the method of micro-beams for the purpose of studying the plastic deformation of steels.
2. Long duration stretching of "Steel 25" at 450°C is accompanied by refining of the fragments in the crystallites and their deorientation. The degree of deorientation of the fragments increases with increasing speed and degree of deformation. The magnitude of the angle of deorientation of the fragments in the investigated cases fluctuate between 5 and 40 mins and the magnitude of the total area of deorientation in the individual crystallite fluctuates within the limits of a few degrees. A fine structure was detected of some fragments formed during deformation.

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SOV/126-6-4-15/34

X-Ray Investigation of Deformed Steel by Means of Micro-Beams.
Part II.

3. In the case of deformation in the cold state of "Steel 25", the breaking away and deorientation of the fragments is considerably more intensive and distortions which occur in the fragments are larger than they are for an equal deformation speed at 450°C.
4. Deformation in the cold state and subsequent annealing at 450°C does not transform the fine structure of the steel into the same state as short duration deformation at 450°C, i.e. the effects of deformation and heating on the structure of the metal are not additive.
5. Fragments in crystallites of deformed "Steel 25" are not equivalent to mosaic blocks and are considerably larger than the latter. However, this does not exclude at all the existence of a mosaic structure of the fragments themselves.
6. Long duration stretching of steel 35KhNM, the composition of which is more complex, is accompanied by a greater breaking up of the crystallites than long duration stretching of "Steel 25" at 450°C.
7. The obtained results lead to the assumption that an

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SOV/126-6-4-15/34

X-Ray Investigation of Deformed Steel by Means of Micro-Beams.
Part II.

increase in the deorientation between fragments brings about an increase in the work hardening of the metal.
8. The sliding mechanism of fragment formation plays a fundamental role in the long duration stretching of carbon steel 25 as well as of the steel 35KhNM, under the conditions pertaining in the experiments described in the paper. There are 6 figures, 1 table and 5 references of which 3 are Soviet and 2 English.

ASSOCIATION: Khar'kovskiy Politekhnikheskiy Institut (Khar'kov Polytechnical Institute)

SUBMITTED: 20th June 1956.

Card 6/6

S/123/59/000/008/029/043
A004/A002

Translation from: Referativnyi zhurnal, Mashinostroyeniye, 1959, No. 8, p. 113,
29418

AUTHORS: Gavranek, V. V., Fuks, M. Ya., Bol'shutkin, D. I.

TITLE: X-Ray Investigation² of Cavitation Erosion of Metals¹⁸

PERIODICAL: Tr. Khar'kovsk. politekhn. in-ta, 1958, Vol. 14, pp. 161-168

TEXT: By X-ray examination, using different methods, the authors investigated the cavitation strength of IX13 grade steel after oil-hardening at 1,000°C and tempering at 680°C. It was found that during the first period of cavitation action a breaking up of the crystals is taking place, while during continued testing the crystal size is stabilized. During the same period, the magnitude of stress of the second kind grows and again returns to its initial value. Those crystallites, located at the surface, are subjected to destruction which are less favorable oriented in relation to the effective stresses from cavitation. The indicated selective destruction is extinguished in the course of time, since the appearing surface relief promotes the destruction of

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S/123/59/000/008/029/043
A004/A002

X-Ray Investigation of Cavitation Erosion of Metals

crystallites already independently from orientation. Probably it is possible to increase the erosion resistance in the initial period of destruction by preliminarily producing a favorable structure in the surface layer of metal (e. g. by cold rolling). It is presumed that cavitation destruction of metals is not taking place owing to plastic deformation, accompanied by a distortion of the crystal lattice, but is similar to the process of impact brittle failure. Crystallites emerging at the surface are eliminated by way of "breaking off", where the following layer of crystallites is laid bare, which are also involved in the effective zone of impact stresses. There are 4 figures and 8 references.

F. M. A.

Translator's note: This is the full translation of the original Russian abstract.

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82570

S/123/60/000/009/008/017
A004/A001

18.5200

Translation from: Referativnyy zhurnal. Mashinostroyeniye, 1960, No. 9, p. 82,
43667

AUTHORS: Fuks, M.Ya., Levenberg, N.Ye.

TITLE: X-Ray Investigations of Residual Stresses During the High-Speed
Power Turning of Steel -6

PERIODICAL: Tr. Khar'kovsk. politekhn. in-ta, 1958, Vol. 14, pp. 169-177

TEXT: The authors investigated residual stresses of the first kind and determined the depth of the cold-hardened layer during power and high-speed turning of metals in comparison with ordinary cutting conditions. Test specimens made of the heat-treated steel grades 3M-10 (EI-10), 40, 35XHM (35KhNM) and 3 were used. The stresses of first kind were determined in the roentgenographic way by the oblique shot method. In the surface layer of the specimens, machined by power and high-speed turning, a two-zone distribution of residual stresses of the first kind could be detected roentgenographically: tensile stresses on the surface and compressive stresses in the lower strata. An increase in the feed from 2 to 4 mm/rev causes the magnitude of residual stresses on the surface to

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S/123/60/000/009/008/017
A004/A001

X-Ray Investigations of Residual Stresses During the High-Speed Power Turning of Steel

rise from 40-60 to 60-80 kg/mm², while the depth of their extension will increase by 100 μ . The maximum tensile stresses in the investigated feed range reach 60-80 kg/mm² while the compressive stresses come up to 25-35 kg/mm². The zone of tensile stresses penetrates into a depth of some 50 μ . The total propagation depth of residual stresses of the first kind amounts to 250-400 μ . The linear function between cold-hardened depth and feed magnitude is correct only for a small range of feed values if turning is carried out with tools of ordinary geometry. A repeated increase in feed is not accompanied by a considerable growth of the depth of cold hardening. An increase of the cutting speed up to 470-565 m/min substantially reduces the extension depth of arising residual stresses of the first kind; it amounts to 80-100 μ . A reversal of the sign is taking place already in the thinnest surface layers at a depth of 20 μ . The maximum magnitude of tensile stresses is approximately 35 kg/mm². The extension depth of stresses of the second kind (cold-hardening) is also insignificant and does not exceed 100 μ . High-speed turning does not result

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82570

S/123/60/000/009/008/017
A004/A001

X-Ray Investigations of Residual Stresses During the High-Speed Power Turning of Steel

in any radical changes in the quality of the surface layer of the tested steel grades from the viewpoint of residual stresses. There are 7 figures and 6 references. ✓

R.V.A.

Translator's note: This is the full translation of the original Russian abstract.

Card 3/3

SOV/137-59-3-6697

Translation from: Referativnyy zhurnal. Metallurgiya, 1959, Nr 3, p 250 (USSR)

AUTHORS: Fuks, M. Ya., Tkach, A. Ya.

TITLE: X-ray Diffraction Studies of Stresses of the First Kind in Nitrided Steel (Rentgenograficheskoye issledovaniye napryazheniy I roda v azotirovannoy stali)

PERIODICAL: Tr. Kharkovsk. politekhn. in-ta, 1958, Nr 14, pp 195-202

ABSTRACT: Specimens of steels 38, KhMYuA, and 20 were investigated. After nitriding, the residual stresses were determined by the method of oblique exposures; this involved X-ray diffraction patterns obtained in the back-reflection camera for three different positions of the surface of the specimens, one perpendicular to the primary bundle of rays and the other two at angles of 45° with respect to the beam. The lattice parameters of the α and γ phase were measured under Cr-K_α radiation. The employment of large reflection angles ($78-80^\circ$), photometric evaluation of the lines, etc., made it possible to determine stresses with an accuracy of $7-10 \text{ kg/mm}^2$. Results of an investigation are presented which demonstrate that compressive residual stresses having a magnitude of up to $40-50 \text{ kg/mm}^2$ are

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SOV /137-59-3-6697

X-ray Diffraction Studies of Stresses of the First Kind in Nitrided Steel

present in the nitrided layer. It was established that the stresses in the phase
are somewhat smaller than those in the α phase

V. Sh.

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18(7)

SOV/48-23-5-19/31

AUTHORS: Fuks, M. Ya., Gol'dshteyn, L. Ya.

TITLE: Investigation by the Aid of an X-Ray Microbeam of Steel Deformed With Varied Velocity at Increased Temperature (Issledovaniye pri pomoshchi rentgenovskikh mikropuchkov stali, deformirovannoy s razlichnoy skorost'yu pri povyshennoy temperature)

PERIODICAL: Izvestiya Akademii nauk SSSR. Seriya fizicheskaya, 1959, Vol 23, Nr 5, pp 629-634 (USSR)

ABSTRACT: By way of an introduction the authors refer to similar investigations carried out by B. A. Movchan, Ye. V. Kolontsova and B. M. Rovinskiy. St.25 was the steel type investigated, the samples were standardized and subsequently, as shown in table 1, they were deformed within different time intervals, with temperature amounting to 450°C. Investigations were carried out with a fine-focus X-ray tube (system according to B. Ya. Pines). Investigations are then extended to the non-deformed state of the samples, in which connection the special inhomogeneities of the lattice period and the disorientation of the structural parts were specially considered. Two microphotograms are shown in this connection, that were taken in the tangential and radial direction of the samples. Investigation results of the deformed state are summarized in table 1.

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SOV/48-23-5-19/31

Investigation by the Aid of an X-Ray Microbeam of Steel Deformed With Varied Velocity at Increased Temperature

Concerning the deformation stages of 6%, 15% and 40% the disorientations of the structural parts determined on the strength of the microphotograms are shown for the various deformation times. There is a strong dependence observable in disorientation on velocity and degree of deformation, namely, disorientation increases with velocity and degree of deformation. The results obtained from the same investigations on the steel type 35KhNM are then compared; the dimensions of the crystallites of this steel are lower by half as compared with those of St.25. It follows from the results thus obtained that in the range of deformation velocity investigated the macroscopic deformation of steel at 450°C is in relation with a displacement mechanism of the structural parts. There are 5 figures, 1 table, and 5 references, 4 of which are Soviet.

Card 2/2

24 (4), 28 (5)

05724

AUTHORS: Fuks, M. Ya., Gladkikh, L. I.

SOV/32-25-10-13/63

TITLE: Application of Hard X-Rays for Determining Residual Stresses

PERIODICAL: Zavodskaya laboratoriya, 1959, Vol 25, Nr 10, pp 1193 - 1195 (USSR)

ABSTRACT: Soft X-rays are generally used for measuring stresses of 1st order and microstresses. The hard X-rays, however, show some advantages, i.e. the dissolution of the K_{α} -doublet is better (because of the higher $\frac{\Delta\lambda}{\lambda}$ -value), and the widening of the line (by dispersity) decreases with a decrease in wave length. Therefore, a dissolution of the K_{α} -doublet takes place on lines with larger reflection angles, also in the case of strongly cold-hardened and highly disperse materials. The advantage of using hard X-rays is represented by means of radiograms (Figs 1,2) obtained for hardened carbon steel St 3 (the pictures were taken in molybdenum radiation by means of a tube of B. Ya. Pines' system). Comparisons of the two X-ray investigation methods (hard and soft rays) can be applied to the study of anisotropy. The measurement results obtained by the

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Application of Hard X-Rays for Determining Residual
Stresses

05724

SOV/32-25-10-13/63

approximation method in iron radiation on lines (110) and (220), in molybdenum radiation on lines (321) and (651, 732), and in iron-molybdenum radiation on lines (651) and (220), are compared with respect to the amount of microstresses, and the range of coherent dispersion (Table). There are 2 figures, 1 table, and 1 Soviet reference.

ASSOCIATION: Khar'kovskiy politekhnicheskii institut im. V. I. Lenina
(Khar'kov Polytechnic Institute imeni V. I. Lenin)

Card 2/2

S/126/60/009/05/012/025

AUTHORS: Bol'shutkin, D.N., Gavranek, V.V. and Fuks, M.Ya.
TITLE: X-ray Investigation of Cavitation Erosion of Metals
PERIODICAL: Fizika metallov it metallovedeniye, 1960, Vol 9, Nr 5,
pp 722 - 725 (USSR)

ABSTRACT: Materials used were the stainless steel 1Kh13 and an aluminium monocrystal. Cavitation tests were carried out using a magnetostriction vibrator of a frequency of 7.5 kc/s and 0.065 mm amplitude. Each sample was photographed twice by a sharp focusing X-ray camera, focusing the lines (110) and (220). Distribution of the influence of the breaking-up of the crystallites of the mosaic and the size of microstresses, on the diffuse lines, was found by the method of approximation and the method of harmonic analysis. It was shown that cavitation erosion occurred in a similar way to brittle fracture, which has been shown to occur, in the main, by breaking up of crystallites with no substantial microstresses. After cavitation erosion for up to 20 min, the (110) lines of the 1Kh13 steel sample showed the presence of an axial texture [110] normal to the surface of the sample. This

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S/126/60/009/05/012/025

E021/E335

X-ray Investigation of Cavitation Erosion of Metals

was produced by preferred disintegration of crystallites with a favourable orientation. Monochromatic and polychromatic radiations were used for the investigation of aluminium. Figure 1a shows the presence of misorientation of fragments of the monocrystal. Figures 1b and c show that in the initial stages of the test, intensive progressive granulation occurred in individual crystallite fragments. Calculations showed that after 45 sec, the surface was polycrystalline to a depth of 0.15 mm. No substantial microstresses were found. Investigations were also carried out on copper samples. The initial grain size was 150 μ and the grain size of the powder as a result of cavitation erosion was 5 μ . No substantial micro-deformation was noted. The results explain the increased cavitation stability of fine-grained alloys. The phase changes occurring in the process of cavitation erosion in the steel U7 were also studied. It was found that tempering of the hardened steel occurred and local temperatures of 450 to 500 °C were reached. There are 4 figures and 4 Soviet references.

Card 2/3

S/126/60/009/05/012/025

E021/E335

X-ray Investigation of Cavitation Erosion of Metals

ASSOCIATION: Khar'kovskiy politekhnicheskii institut
imeni V.I. Lenina (Khar'kov Polytechnical Institute
imeni V.I. Lenin)

SUBMITTED: July, 25, 1959

n.b. This paper was presented at the Sixth All-Union
Conference on Applying X-rays for Investigating
Materials, June, 1958. ✓

Card 3/3

26022

S/139/61/000/003/002/013
E073/E335

11800

AUTHOR: Fuks, M.Ya.

TITLE: X-ray Investigation of Chromium-plating Layers
of Various Degrees of Hardness

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Fizika,
1961, No. 3, pp. 9 - 13

TEXT: The aim of the work was to carry out X-ray investigations of chromium-plating layers for the purpose of elucidating the substructure features which are observed on plating layers of high hardness. In specimens which have been plated with hard and soft chromium layers, microstresses and dispersion of the mosaic blocks were established by means of harmonic analysis of the curve of distribution of the intensity of the interference lines. To some extent the texture was also studied. The experiments were made on specimens of 1X13 (1Kh13) steel and the carbon steel 3, which were chromium-plated to a thickness of 20-30 μ (specimens 70 x 60 and 60 x 30 mm) in an electrolyte of the following composition: CrO_3 - 440 g/litre; H_2SO_4 - 4.4 g/litre. A good correlation was found to exist between the

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X

X-ray Investigation of

26022

25939
S/139/61/000/003/002/013
E073/E335

hardness of the chromium layer and the degree of perfection of its structure. Calculations have shown that the axis of the unbounded texture of the hard chromium is the direction $[111]$, which is in good agreement with data published by V.I. Arkharov in 1938. The width of the (211) lines in the case of hard chromium-plating is almost 2.5 times as great as in the case of soft chromium-plating. The increased hardness of the chromium-plating with increasing current density is accompanied by a considerable refining of the mosaic blocks. The average linear diameter of the hard chromium blocks is about 1.5×10^{-6} cm and of the soft chromium blocks is about 12×10^{-6} cm; the dislocation density in the hard chromium reaches 10^{12} cm⁻². The view is expressed that dispersion of the mosaic structure is caused by formation of a large number of crystallisation centres in the case of a high cathode current density. Short-duration heating for 1 hour at 200 and 500 °C leads to a slight drop in hardness of the chromium layer to 100 - 150 kg/mm², for an initial hardness level of 800 kg/mm².
Card 2/3

26022

S/139/61/000/003/002/013
E073/E335

X-ray Investigation of

This is accompanied by a coarsening of the blocks, the average linear dimensions of which increased to about double their initial value. There are 2 figures, 1 table and 4 Soviet references.

ASSOCIATION: Kharkovskiy politekhnicheskii institut
imeni V.I. Lenina (Khar'kov Polytechnical
Institute imeni V.I. Lenin)

SUBMITTED: July 6, 1960

Card 3/3

24.7.200

24475
S/126/61/011/006/001/011
EO21/E306

AUTHORS: Palatnik, L.S., Fuks, M.A., Boyko, B.T. and
Pariyskiy, V.B.

TITLE: Electronographic Study of Substructure of Thin
Condensates of Aluminium by the "Microbeam" Method

PERIODICAL: Fizika metallov i metallovedeniye, 1961, Vol. 11,
No. 6, pp. 864 - 869 + 1 plate

TEXT: The electron microbeam is suitable for studying
individual reflections from crystallites of dimensions 100 -
300 Å and for evaluating the relative misorientation between
crystallites. Thus, the electronographic microbeam is a
direct method of observing the substructure of crystals.
Aluminium films 60 - 200 Å thick, condensed in vacuo on a
cold surface, were studied by this technique. The films were
transferred to aluminium foil with holes of 20 to 70 μ². The
thickness of the film was estimated by a photometric method
with an accuracy of 10%. Photographs were taken in a high-
temperature electronograph with electrostatic focusing. The
films were heated at a rate of 30 °C/min and electron-diffraction
Card 1/6

24475

S/126/61/011/006/001/011
E021/E306

Electronographic Study

patterns were taken at room temperature, 200, 300, 400 and 450 °C. The mean linear dimension of a coherent, reflecting region for films heated to 400 °C was 140 - 335 Å. This is similar to the mean dimensions of mosaic blocks determined by X-ray investigation of deformed polycrystals. The Debye ring at 20 and 200 °C appears continuous and diffuse. Heating to 300 °C results in the appearance of intensive spots but the general background is still retained. At 400 °C this background is very weak and at 450 °C it disappears. The number of spots remains practically unchanged on increasing the temperature from 300 to 450 °C. Photographs are included for the (111) and (200) lines taken from a film 125 Å thick on an area of 20 μ², heated to 300, 450, 400 and 450 °C (X15). At a magnification of 60, spots of increased blackness can be seen on the electron-diffraction patterns taken at 20 and 200 °C. The complete results are tabulated. The mean linear dimension of the crystallites was calculated from two formulae:

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Electronographic Study

S/126/61/011/006/001/011
E021/E306

$$L_{cp} \approx \sqrt[3]{v_o} \quad (2)$$

and

$$L \approx \sqrt{v_o/h} \quad (3)$$

where v_o is the mean volume of the region giving coherent reflections and

h is the film thickness.

The size of the crystallites increases with increase in temperature. The degree of misorientation of crystals in condensed films is somewhat greater than the values for ordinary crystals. This may explain the high resistance to plastic deformation and high rate of diffusion of such films. There are 2 figures, 1 table and 11 references: 7 Soviet and 4 non Soviet. The two English-language references quoted are: Ref. 10. Quarrel, A.G., Roebuck, J.S. Proc. Roy.

Card 3/6

24475

Electronographic Study

S/126/61/011/006/001/011
E021/E306

Soc., 1934, A.145, 676: Weaver, C., Hill, R.M. Advances in
Physics, 1959, Vol. 8, 575.

ASSOCIATION: Khar'kovskiy gosudarstvennyy universitet im.
A.M. Gor'kogo (Khar'kov State University im.
A.M. Gor'kiy)
Khar'kovskiy politekhnicheskii institut
im. V.I. Lenina (Khar'kov Polytechnical
Institut im. V.I. Lenin)

SUBMITTED: January 21, 1961

Card 4/6

7546

S/126/62/013/001/005/018
EO21/E580

24,7700

AUTHORS:

Palatnik, L.S., Boyko, B.T., Fuks, M.Ya. and
Pariyskiy, V.B.

TITLE:

Electron diffraction study of the substructure of
thin films of aluminium, silver and gold, condensed in
vacuo

PERIODICAL:

Fizika metallov i metallovedeniye, v.13, no.1, 1962,
71-76

TEXT:

The influence of film thickness and substrate temperature on the mean size of mosaic blocks was investigated in thin condensed films of aluminium, silver and gold. Aluminium of 99.999% purity and silver and gold of 99.9% purity was used. Evaporation was carried out from a cone-shaped tungsten spiral at rates of 4×10^{-4} , 5×10^{-4} and 10^{-4} g/sec for Al, Ag and Au, respectively. Condensation occurred on a heated glass plate. The films were separated by immersion in distilled water and caught on metallic holders of foil containing 0.2-0.4 mm holes. The films were examined by electron diffraction using the (220) ring. The effect of heating the films was studied. The true diffraction broadening was found by harmonic analysis (Ref.6: B.Ya.Pines Card 1/5)

Electron diffraction study ...

S/126/62/013/001/005/018
E021/E580

Ostrofokusnyye rentgenovskiy trubki i prikladnyy rentgeno-strukturnyy analiz (Fine focussing X-ray tubes and applied X-ray structural analysis), GITTL, 1955). The main contribution to the broadening arises from the small size of the mosaic blocks. When there is a marked difference in the coefficients of expansion of the holder and the film, the latter is subjected to plastic deformation in the process of heating which is accompanied by a refining of the blocks. With rapid heating, recrystallisation does not remove this effect. Therefore, thermal coefficients of the film and holding material should be approximately equal. With increasing film thickness of aluminium and silver, the broadening of the lines decreases both in the initial and annealed states. Continuous heating of aluminium films up to 150°C in 2-3 min leads to refining of the mosaic blocks, whereas heating to higher than 150°C results in coarsening. Heating silver and gold in the region 20-100°C also results in coarsening. The mean linear dimension of the blocks in aluminium film is about half that in silver and gold films, and coarsening during heating takes place less intensively in aluminium. The probable reason for this difference is the formation of highly dispersed aluminium oxide. The mosaic

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Electron diffraction study ...

S/126/62/013/001/005/018
E021/E580

structure is more dispersed in condensed films than in ordinary massive samples after cold deformation. The high dispersion of the blocks and their strong misorientation can be judged from the high strength of thin condensed films. There are 4 tables.

ASSOCIATION: Khar'kovskiy politekhnicheskii institut im.
V. I. Lenina
(Khar'kov Polytechnical Institute imeni V.I.Lenin)

SUBMITTED: May 20, 1961

Card 3/3

34321

S/032/62/028/003/007/017

B101/B138

1.1800

18.9100 (2408)

AUTHORS: Fuks, M. Ya., and Boyko, B. T.

TITLE: Electron diffraction investigation of the substructure of condensed metal films

PERIODICAL: Zavodskaya laboratoriya, v. 28, no. 3, 1962, 300 - 305

TEXT: Pure aluminum was vacuum evaporated on to various bases (film thickness 65 - 240 Å), and the substructure was studied by electron diffraction analysis. It was found that harmonic analysis of interference lines can only be used to eliminate instrumental effect and not to determine lattice micro stresses. A series of tests with aluminum films on tantalum bases showed strong deformations due to differences in the coefficients of thermal expansion of the two metals. Therefore when studying the substructure of thin films bases should be used whose expansion coefficients do not greatly differ from those of the film to be investigated. To determine block sizes, a microbeam was used which irradiated only a 10 - 20 μ^2 sector of the film. Aluminum foils about 10 μ thick were perforated by a needle or an electric spark, and the film was

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S/052/62/028/003/007/017
B101/B138

Electron diffraction investigation...

deposited on the sector contained by this opening. "Microdot" electron diffraction patterns of lines (111) and (200) were obtained for film of 125 Å thickness at 300 - 400°C, and measured photometrically. At 400°C, the linear dimension of the reflecting blocks was 200 - 300 Å; this is the same size as that obtained for mosaic blocks by X-ray diffraction analysis of deformed polycrystals. The angle of disorientation of adjacent blocks was found to be more than 3°. Photographs of the aluminum foil backing did not reveal any substructure. The background between the point reflexes indicates that there are some smaller blocks besides those due to annealing. Thus, the sizes obtained by the microbeam method are not averages, but those of the larger blocks. The average size can be found from the diffraction broadening of the lines; it was 90 Å at 300°C. This method may permit an investigation of the substructure of films of refractory metals, if the irradiated area is reduced to 1 - 2 μ^2 and the light intensity of the electron diffraction photography is increased. The following authors are mentioned: B. Ya. Pines (Ostrofokusnyye rentgenovskiy trubki i prikladnoy rentgenostrukturnyy analiz (Focusing x-ray tubes and applied x-ray diffraction analysis), GITTL (1955), and B. Ya. Pines and A. F. Sirenko (Kristallografiya, 7. 1 (1962)). There are

Carl 2/3

PALATNIK, L.S.; BOYKO, B.I.; FUKS, M.Ya.; PARIISKIY, V.B.

Electronographic investigation of the substructure of thin films of aluminum, silver, and gold condensed in vacuum. Fiz.mot.i metalloved. 13 no.1:71-76 Ja '62. (MIRA 15:3)

1. Khar'kovskiy politekhnicheskoy institut imeni V.I.Lenina. (Metallic films) (Electron diffraction examination)

FUKS, M.Ya.; GLADIKH, L.I.

Methods of determining lattice spacing from broadened spectrum lines. Zav.lab. 28 no.6:697-700 '62. (MIRA 15:5)

1. Khar'kovskiy politekhnicheskii institut imeni V.I. Lenina.
(Crystal lattices)

FUKS, M.Ya.; GLADIKH, L.I.

Investigation of oriented microstresses with the help of hard X rays. Fiz.met.i metallov. 15 no.4:523-528 Ap '63.
(MIRA 16:6)

1. Khar'kovskiy politekhnicheskii institut imeni Lenina.
(Crystal lattices) (Metallography)

BOYKO, B.T.; PANCHUKHA, P.A.; POIENOVA, V.M.; FUKS, M.Ya.

Comparing the degree of disorientation of separately reflecting regions in thin vacuum condensates and solid specimens of aluminum. Fiz. met. i metalloved. 75 no.4:540-543 0 '63. (MIRA 16:12)

1. Khar'kovskiy politekhnicheskii institut.

APPROVED FOR RELEASE: 03/13/2001

CIA-RDP86-00513R000513910001-1"

ACCESSION NR: A23003850

ENT(1)/ENT(2)/ENT(3)/ED3

ASPTG/ASD/ESD-3 JD/1JF(C)

S/0020/63/151/003/0356/0559

AUTHORS: Palatnik, L. S.; Fuka, M. Ya.; Boyko, B. T.; Panchukha, A. P.

63

TITLE: Electron-diffraction studies of elastic deformation in thin polycrystalline deposited films of aluminum and silver

ISSN: Doklady, v. 151, no. 4, 1963, 550-553

TOPIC TAGS: electron diffraction, elastic deformation of metal, condensed thin metal film, aluminum, silver

ABSTRACT: Macroscopic deformation in polycrystalline films depends not only on the structure and properties of the crystals forming the film but also on their interaction and on the boundary structure. Electron-diffraction permits the determination of elastic deformations of the crystalline lattice by measurement of the interplanar distances. The deformation limit depends on interatomic interactions and on the degree of perfection of the crystals themselves - the regions of coherent electron diffraction (r.c.e.d.). A method of r.c.e.d. has been developed by the authors. Films were formed on glass plates covered by powdered NaCl, by evaporation and condensation of pure metals removed in water and caught on a metal slit 0.1mm wide. The deformation of the lattice in two perpendicular

L 14356-63

ACCESSION NR: AP3003850

directions is given in 2 figures for aluminum and silver. The results indicate high degree of perfection of crystals grown from individual nuclei. Their strength approaches the theoretical one. Orig. art. has: 2 figures.

ASSOCIATION: none

SUBMITTED: 04May63

DATE ACQ: 15Aug63

ENCL: 00

SUB CODE: PH

NO REF SCV: 005

OTHER: 005

Card 2/2

ACCESSION NR: AP4039600

S/0126/64/017/005/0726/0731

AUTHORS: Palatnik, L. S.; Fuks, M. Ya.; Boyko, B. T.; Pugachev, A. T.

TITLE: Electronographic and roentgenographic investigation of substructure of thin nickel and iron films condensed in vacuum

SOURCE: Fizika metallov i metallovedeniye, v. 17, no. 5, 1964, 726-731

TOPIC TAGS: nickel, iron, thin film, vacuum condensation, electronographic analysis, x ray analysis, gold, aluminum, silver, electronograph EG, diffractometer URS 50Im, metal film substructure, elasticity limit

ABSTRACT: Thin nickel and iron films precipitated in vacuum were investigated to compare their structures to those of gold, aluminum, and silver. The samples consisted of metal films 200 Å thick condensed on unheated base plates. These plates were made of glass and of NaCl crystals. Some films were precipitated on thin collodion films. Samples prepared in the above way were analyzed in transient light in the electronograph EG. The x-ray study was performed with a diffractometer URS-50Im. For this purpose, samples consisting of 30 overlying films were prepared.

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ACCESSION NR: AP4039600

The results obtained by these two methods supplemented each other because the x-ray analysis revealed substructural characteristics in the direction perpendicular to the film surface, while the electronographic analysis showed them in the direction parallel to the surface. Average linear size of the block crystals, measured parallel to the surface, was 20-30 Å; it was 80-90 Å in the perpendicular direction. These block crystals had a columnar structure and occurred in a plane-stressed state. The microstress magnitude varied from 200 to 300 kg·mm⁻². Its origin was explained by the condensation process rather than by the deformation induced during separation of films from their base plates. Large microstresses were regarded as evidence of a high elastic deformation limit in the block crystals. This assumption was sustained by results of a direct load-testing of the film. Orig. art. has: 2 tables, 4 figures, and 1 formula.

ASSOCIATION: Khar'kovskiy politekhnicheskoy institut im. V. I. Lenina (Khar'kov Polytechnic Institute)

SUBMITTED: 24Jun63

DATE ACQ: 19Jun64

ENCL: 00

SUB CODE: MM

NO REF SOV: 008

OTHER: 001

Card 2/2

PALATNIK, L.S.; FUKS, M.Ya.; LOYKO, B.T.; PUGACH'EV, A.T.

Electronography and X-ray study of the substructure of thin
films of nickel and iron condensed in vacuum. Fiz. met. i
metalloved 17 no.5:726-731 My '64. (MIRA 17:9)

1. Khar'kovskiy politekhnicheskii institut imeni Lenina.

FUKS, M.Ya.; KOZ'LOV, A.A.

X-ray investigation of the defects of packing in a deformed
permalloy. Fiz. met. i metalloved. 17 no.5:760-767 By '84.
(MIRA 17:9)

1. Khar'kovskiy politekhnicheskii institut imeni Lenina.

GLADKIKH, L.I.; KUZ'MENKO, O.G.; FUKS, M. Ya.

Comparing the results of investigation of powder specimens by
the methods of approximation and harmonic analysis. Zav. lab.
30 no.6:712-716 *64 (MIRA 17:8)

1. Khar'kovskiy politekhnicheskii institut imeni V.I. Lenina.

L 62919-65 EWT(m)/EWP(i)/EWA(d)/T/EWP(t)/EWP(z)/EWP(b)/EWA(c) IJP(c)

JD/HW

ACCESSION NR: AP5013859

UR/0126/65/020/001/0103/0110

539.23 : 548.73

AUTHOR: Fuks, M. Ya.; Koz'ma, A. A.; Palatnik, L. S.

TITLE: Investigation of packing defects, dispersion in the range of coherent scattering, and microdeformation in condensed films of permalloy and nickel

SOURCE: Fizika metallov i metallovedeniye, v. 20; no. 1, 1965, 103-110

TOPIC TAGS: crystal lattice defect, material deformation, x ray diffraction, coherent scattering, metal film, statistic analysis, probability

ABSTRACT: A statistical method is presented for approximation of packing defect probability. The method does not require the accuracy of measurement of diffraction lines that the center-of-gravity method requires. Dispersion in the range of coherent scattering, microdeformation, and packing defect probability are studied in relation to condensation conditions and subsequent annealing. Materials tested are permalloy with 50 percent nickel, permalloy with 75 percent nickel, and pure nickel, in the form of condensed films 1-2 microns thick, and in the form of filings. Probability of size packing defects in the films is higher than the probability of de-

Card 1/2

L 62919-65

ACCESSION NR: AP5018859

formation packing defects while the reverse is true in the filings. Packing defect probability is greater in permalloy films than in nickel films. Microdeformation and dispersion in the range of coherent scattering are greater in the films than in the filings. Orig. art. has: 3 figures, 3 tables, 12 formulas.

ASSOCIATION: Khar'kovskiy politekhnicheskii institut im. V. I. Lenin (Khar'kov Polytechnic Institute)

SUBMITTED: 04Jun64

ENCL: 00

SUB CODE: MM

NO REF SOV: 008

OTHER: 006

dm
Card 2/2

L 1355-66 EWT(m)/EWP(t)/EWP(t)/EWP(b) IJP(c) JD/HW

ACCESSION NR: AP5021938

UR/0126/65/020/002/0280/0287
539.292; 548.4

56
53
B

AUTHOR: Palatnik, L. S.; Koz'ma, A. A.; Fuka, M. Ya.; Pilipenko, V. V.
44,55 44,55 44,55 44,55

TITLE: X-ray examination of packing defects in vacuum-condensed cobalt films

SOURCE: Fizika metallov i metallovedeniya, v. 20, no. 2, 1965, 280-287

TOPIC TAGS: crystal lattice defect, cobalt, metal film, vaporization, crystal lattice structure

ABSTRACT: Crystal-structure defects in vacuum-condensed Co films are relatively uninvestigated. Yet they are of special interest in view of the presence in Co of a polymorphic transformation with signs of a martensitic nature. Hence, the authors investigated, by means of a X-ray diffractometer, the packing defects, dispersity of regions of coherent scattering, and randomness of distribution of microdeformations in specimens of $\sim 4 \mu$ thick vacuum-evaporated pure (99.95%) cobalt film with different proportions of hexagonal and cubic Co modifications. Deformation-caused packing defects were detected in hexagonal cobalt Co^h . In the presence of substrate temperature $T_s = 240^\circ C$ their probability is $\alpha = 0.057$.

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L 1355-66

ACCESSION NR: AP5021938

3

whereas at $T_g = 475^\circ$ they were not detected at all. The dependence of the dimensions of regions of coherent scattering (r.c.s.) and magnitude of microdeformations on T_g is nonmonotonic. At $T_g = \sim 380^\circ\text{C}$ the r.c.s. decrease and microdeformations increase, which is in agreement with the decrease in the microhardness of the film. The film containing mostly cubic cobalt Co^c displays both types of packing defects at $T_g = 240^\circ\text{C}$. Deformation-caused packing defects are less heat-resistant than growth defects; at 530°C they can no longer be detected, whereas the probability of growth defects persists as far as 610°C , at which temperature two varieties of cubic Co can be detected: one defect-free, forming in the process of heating, and the other with growth defects, forming in the process of condensation. The high probability of packing defects in vacuum-condensed cobalt films as compared with the vacuum-condensed films of other metals is conditioned by the specific nature of polymorphism in cobalt as well as by the low energy of packing defects in this metal. Harmonic analysis of line profile is the most reliable method of determining the probability of packing defects in vacuum-condensed cobalt. Orig. art. has: 3 figures, 3 tables, 4 formulas.

ASSOCIATION: Khar'kov / politekhicheskii institut im. V. I. Lenina ⁴⁴⁵⁵ (Khar'kov

Card 2/3

L 1355-66

ACCESSION NR: AP5021938

Polytechnic Institute)

SUBMITTED: 09Jul64

ENCL: 00

SUB CODE: ES, MM

NO REF SOV: 009

OTHER: 004

Card

3/3

FUKS, M.Ya.; GLADIKH, L.I.

Some characteristics of the radiographic method of measurement
of elastic stresses. Zav. lab. 31 no.8:978-983 '65.

(MIRA 18:9)

1. Khar'kovskiy politekhnicheskij institut.

FUKS, M.Ya.; KOZ'MA, A.A.; PALATNIK, L.S.

Investigating the defects of packing the dispersion of content
scattering regions, and microdeformations in permalloy and
nickel condensation films. Fiz. met. i metalloved. 20 no.4:
103-110 J1 '65. (MIRA 18:11)

1. Khar'kovskiy politekhnicheskii institut imeni V.L. Lenina.

L 00739-67 EWT(1)/EWT(m)/EWP(t)/ETI IJP(c) JD/AT/JH

ACC NR: AP6018942

SOURCE CODE: UR/0126/66/021/006/0848/0853

AUTHOR: Palatnik, L. S.; Fuks, M. Ya.; Boyko, B. T.; Panchekha, P. A.

ORG: Kharkov Polytechnic Institute im. V. I. Lenin (Khar'kovskiy politekhnicheskiy institut)

TITLE: Electron diffraction study of the block structure of aluminum condensates

SOURCE: Fizika metallov i metallovedeniye, v. 21, no. 6, 1966, 848-853

TOPIC TAGS: aluminum, metal film, electron diffraction analysis

ABSTRACT: In an earlier paper, the authors described the electron diffraction micro-beam method for determining the size and disorientation of block crystallites in aluminum vacuum condensates 60-200 Å thick after annealing at 300° and above. In the present work, this technique was developed by increasing the resolution of the various reflections, so that the point diffraction lines on the electron diffraction patterns were obtained with films in the initial (unannealed) state. This made it possible to study the substructure of the films without altering it by the subsequent action of heat. The average length of the blocks in unannealed Al films condensed on an unheated substrate changes from 220 to 320 Å as the film thickness changes from 150 to 750 Å. The lower limit of the disorientation angles is 1.5-2°. Films 150 Å thick have a monoblock structure in their thickness. At 400 Å and higher, the monoblock character is impaired; it is probably a structural factor which determines the effect of the thick-

Cord 1/2

UDC: 548.4

L 00739-57

ACC NR: AP6018942

ness on certain structurally sensitive properties. The presence of a sufficiently large number of blocks in the thickness of the film makes the latter similar to massive bodies. The density of the stream of condensing atoms is one of the parameters determining the form of the blocks, i. e., their size in the plane of the film and along the normal to it. Physical properties sensitive to the substructure may be different in the plane of the film and along the normal. Orig. art. has: 1 figure, 1 table, and 5 formulas.

SUB CODE: 11/ SUPM DATE: 15Jun65/ ORIG REF: 006/ OTH REF: 004

Card 2/2 *20*

L 09010-67 EWT(m)/EWP(t)/ETI IJP(c) JD/JH

ACC NR: AP6027788

(A)

SOURCE CODE: UR/0126/66/022/001/0073/0077

AUTHOR: Palatnik, L. S.; Fuks, M. Ya.; Boyko, B. T.; Panchekha, P. A.

36

ORG: Khar'kov Polytechnic Institute im. V. I. Lenin (Khar'kovskiy politekhnicheskiy institut)

TITLE: X-ray diffractometric investigation of the substructure of thin aluminum condensates

SOURCE: Fizika metallov i metallovedeniye, v. 22, no. 1, 1966, 73-77

TOPIC TAGS: diffractometer, x ray diffraction analysis, aluminum, metal vapor deposition /
/ URS-50IM diffractometer

ABSTRACT: This work is a continuation of a previous investigation (Palatnik, L. S., et al. FMM, 1966, 21, 848), with the difference that it employs the x-ray diffractometric method to verify the possibility of differences between certain structurally sensitive physical properties in the plane of the thin film and along the normal with respect to this plane, which is assumed to be conditioned by different mechanisms of formation of regions of coherent scattering as a function of the condensation rate. To this end, 99.99% pure Al was vacuum-evaporated on two unheated glass substrates coated with NaCl and located at different distances

1
Card 1/2

UDC: 620.183.48

L 09010-67

ACC NR: AP6027788

0

from the evaporator. The mean condensation rate on one substrate was $7 \text{ \AA} \cdot \text{sec}^{-1}$ and on the other substrate, $23 \text{ \AA} \cdot \text{sec}^{-1}$. The film obtained on the substrate closer to the evaporator was 1600 \AA thick, while the film obtained on the more distant substrate was 500 \AA thick. Packets of these films were then investigated with the aid of an URS-50IM diffractometer. Findings: for the thicker films (1600 \AA), due to the higher condensation rate as compared with the thinner films (500 \AA), the mean volume of regions of coherent scattering (r.c.s.) is greater, with the size of these regions increasing both the plane of the film and at right angles thereto. Even so, however, the increase in film thickness becomes greater than the increase in the size of the r.c.s. in the direction normal to the film plane so that, after passing through some critical thickness, the formerly monocrystalline film now becomes polycrystalline in thickness. Orig. art. has: 1 figure, 2 tables.

SUB CODE: 20, 11, 13/ SUBM DATE: 16Jul65/ ORIG REF: 006/ OTH REF: 002

Card 2/2 nst

L 23111-66 ENT(m)/EWP(t) IJP(c) JD/HW

ACC NR: AP6009486

UR/0020/66/167/001/0077/0079

AUTHOR: Palatnik, L.S.; Boyko, B.T.; Fuks, M.Ya.; Pugachev, A.T.

ORG: Kharkov Polytechnic Institute im. V.I.Lenin (Khar'kovskiy polit-ekhnicheskii institut)

TITLE: Elastic anisotropy of polycrystalline condensed films

SOURCE: AN SSSR. Doklady, v.167, no.1, 1966, 77-79

TOPIC TAGS: polycrystalline film, crystal anisotropy

ABSTRACT: The article describes electronographic studies of the deformation of thin polycrystalline films of aluminum, silver, and nickel, with thicknesses of 400-500 Å, condensed in a vacuum of 5×10^{-5} torr, at different temperatures of the support. The rate of condensation was 20-40 Å/sec. The films, separated from the support, were transferred to a plate with a slit and were put into the electronograph by means of a special device. Results of examination showed that, for thin polycrystalline vacuum condensates of the elastically anisotropic metals silver and nickel, the elastic anisotropy of the individual crystals was preserved, although not to the degree that might be expected for complete isotropy of the stress field, such as for example, for isolated mono-

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UDC: 539.4.015 + 539.23 + 539.27

I. 23111-66

ACC NR: AP6009486

crystals. For aluminum films with a weakly marded elastic anisotropy, anisotropic elastic deformations of the lattice were not observed electronographically. In nickel films, condensed at a temperature of 65°, the average size of the crystal blocks, observed by diffraction expansion, was 30 Å. Even with such a dispersed structure the elastic anisotropy of the individual blocks was preserved, but there was observed a tendency for it to become weaker in comparison with coarse grained films. Orig. art. has: 1 formula and 3 figures.

SUB CODE: 20/ SUBM DATE: 06Dec65/ ORIG REF: 006/ OTH REF: 001

Card

2/2

ACC NR: AP7000658

(A)

SOURCE CODE: UR/0126/66/022/005/0744/0751

AUTHOR: Palatnik, L. S.; Fuks, M. Ya.; Il'inskiy, A. I.; Alaverdova, O. G.

ORG: Khar'kov Polytechnic Institute im. V. I. Lenin (Khar'kovskiy politekhnicheskiy institut)

TITLE: The structure and mechanical properties of vacuum-deposited copper films

SOURCE: Fizika metallov i metallovedeniye, v. 22, no. 5, 1966, 744-751

TOPIC TAGS: copper thin film, vacuum deposited film, film substructure, film mechanical property, thin film, metal film, metal deposition

ABSTRACT: Copper films, 0.5—70 μ thick, were made by vacuum deposition of 99.95%-pure copper at a rate of 0.5—1.6 μ /min on copper substrate maintained at 90—250C and their substructure and mechanical properties were investigated by various methods of physical analysis and by mechanical tests. It was found that the film strength, microhardness, and microstresses decreased with increasing temperature of the substrate, while the size of the mosaic blocks increased. The microstresses in the films were significantly higher than the yield strength of solid copper and in a film deposited on the substrate at 90C in a vacuum of 10^{-4} mm Hg reached 60 kg/mm². The film thickness in the 0.5—50 μ range had little or no effect on the mosaic block size and microstresses. In films 40—50 μ thick, the

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UDC: 669.3 : 539.23

ACC NR: AP7000658

substructure characteristics varied along the film thickness: mosaic blocks on the substrate side were substantially larger and the microstresses much lower than on the opposite side, which is explained by the relaxation and recrystallization processes under the effect of substrate heat. Films 0.5—20 μ thick had the maximum tensile strength, 80—88 kg/mm². With increasing film thickness to 50—70 μ , the strength dropped 30—35% because of the inhomogeneity of thick films. The size of mosaic blocks increased and the level of microstresses sharply decreased with a deeper vacuum. The residual gases and impurities from the crucible cause absorption phenomena and also "alloying" or oxidation of condensed copper, and retard the relaxation and recrystallization processes, i.e., increase the stability of the condensate. Orig. art. has: 6 figures and 4 tables. [MS]

SUB CODE: 11/ SUBM DATE: 17Jan66/ ORIG REF: 008/ OTH REF: 005/ ATD PRESS: 5109

Card 2/2

ACC. NR: AP6033898

SOURCE CODE: GE/0030/66/017/002/0543/0554

AUTHOR: Palatnik, L. S.; Fuks, M. Ya.; Lukashenko, L. I.; Ravlik, A. G.; Kozma, A. A.

ORG: Polytechnical Institute imeni V. I. Lenin, Khar'kov (Polytechnisches Institut)

TITLE: The structure and magnetic properties of condensed ferromagnetic films

SOURCE: Physica status solidi, v. 17, no. 2, 1966, 543-554

TOPIC TAGS: magnetic thin film, electromagnetic film, vacuum degassing, cobalt, permalloy, magnetic anisotropy, ferromagnetic film

ABSTRACT: Two series of permalloy, Fe, Ni and Co films were prepared by conventional degassing and vacuum deposition at 10^{-4} to 10^{-5} torr; the thickness h of the film varied from 0.1 to 30.0 μ . The first series included films with $h \approx 1.5 \mu$, the second series included films with $h \approx 0.5 \mu$. The films were examined for oriented and disoriented microstresses, the grade of the dispersion of blocks, and the concentration rate of stacking faults. Various forms of structural and phase nonequilibrium were also examined. The structural peculiarities are caused by the preparation conditions as well as by the heat treatment of the film. Thus in Ni and permalloy condensates, oriented microstresses were found to exist in a direction close to normal to the film; they reach the order of 25 kg/mm² and decrease with increasing substrate temperature. It is believed that at least to some extent these microstresses affect

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ACC NR: AP6033898

the magnetic anisotropy in the direction of the normal. The films have a high rate of block dispersion; the mean linear block size is 100 Å at a substrate temperature of ~200°C. The concentration of twin stacking faults in permalloy films reaches up to 60%. In Co films, the deformation stacking faults were found to predominate on account of the polymorphism. The observed decrease of the coercive force in Co films at substrate temperature ~480°C is related to the decreasing concentration of the hexagonal phase. There is a distinct correlation between the structural state of the films, and their magnetic properties. This correlation is especially pronounced for the phase nonequilibrium (Co films), and for structural nonequilibrium (the effect of the texture upon the magnetic anisotropy of Co and Fe condensates). The correlation of other characteristics (stacking faults, block dimensions, disoriented microstresses, etc.) requires further study. Orig. art. has: 3 figures, 4 tables.

SUB CODE: 11,20/

SUBM DATE: 31May66/

ORIG REF: 010/

OTH REF: 008

Card 2/2

FUKS, N. [translator]; ZENER, C.; HOLLOWOMON, J.H. [authors].

~~Problems of nonelastic deformations of metals~~ (From: Journal of Applied Physics, 17, 69, 1946; translated by N.Fuks). C.Zener, J.H.Hollowomon. Usp. fiz. nauk 31 no.1:17-37 '47. (MLRA 6:12)
(Deformations (Mechanics)) (Metals)

FUKS, N. [translator]; HOLLOWON, J.H.; ZENER, C. [authors].

Breaking points in metals (From: Journal of Applied Physics, 17,
82, 1946, translated by N.Fuks). J.H.Hollowon; C.Zener. Usp. fiz.
nauk 31 no.1:38-52 '47. (MIRA 6:12)

(Metals) (Strains and stresses)

FUKS, N.

Under the new conditions. Okhr. truda i sots. strakh. 6
no.5:18-19 My '63. (MIRA 16:8)

1. Glavnyy vrach Uvarovskoy rayonnoy bol'nitsy.
(Uvarovo District (Tambov Province)—Agriculture--Hygienic aspects)

1957 AND 1960 EDITIONS

PROCESSES AND PROPERTIES INDEX

2

Kinetics of hydration of meta- and pyrophosphoric acids. N. FUCUS, J. Russ. Phys. Chem. Soc. 61, 1015-44 (1929). If only the non-dissociated mole of the acids react during hydration of meta- and pyrophosphoric acids $k = k_0(1 - \alpha)$ where k is a const. obtained exper., and α is the dissociation coeff. Published exper. data are used to show that k is indeed almost const., throughout a considerable variation in concn. of the acids and of H ions. Explanation is afforded for the increase in the amt. of pyrophosphoric acid during hydration of metaphosphoric acid when the concn. of the soln. increases.

BERNARD NELSON

ASD SLA METALLURGICAL LITERATURE CLASSIFICATION

82

TEST AND ANALYSIS		PROCESSING AND PROPERTIES INDEX	
<p>Kinetics of drying vegetable oils. N. PUKA. <i>J. Applied Chem. (U.S.S.R.)</i> 5, 1046-52 (1952). The rate of O absorption is, within certain limits, independent of the thickness of the layer of the linseed oil. The depth of the gelatinized layer does not increase if the depth of the oil is increased beyond the above limit, and the amt. of O absorbed also remains unchanged. If the rate of oxidation is W, the concn. of O is C and b and d are const., $W = dC/(b + C)$. The const. b is small and the rate of oxidation in pure O is only 3% higher than in air. The equation has theoretical foundation if the oxidation of the oil is assumed to proceed in 2 phases: addn. of O to the catalyst and its transfer in an activated state to the triglycerides of the oil. The second assumption does not contradict the chain theory of the reaction. Practical applications of the equation are discussed. The theory of Blom (<i>C. A.</i> 21, 1720) on the mechanism of drying is unacceptable. Also in <i>Kolloid Z.</i> 61, 365-70 (1932). V. KALICHEVSKY</p>			
<p>ASB.SLA METALLURGICAL LITERATURE CLASSIFICATION</p>			
<p>SEARCHED INDEXED</p>		<p>CLASSIFIED</p>	
<p>1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100</p>		<p>1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100</p>	

1ST AND 2ND ORDERS

PROCESSES AND PROPERTIES

2

Surface condensation. N. Fuchs. Physik. Z. Soviet Union 4, 481-7 (1931). The Frenkel theory postulating a sharply defined crit. temp. for condensation is criticized. Recent expt. results point to the significance of surface discontinuities. This latter conception can be satisfactorily explained by the general Gibbs-Volmer theory. Howard A. Smith

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

FROM STEINBERG

1940-41

1942-43

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PROCESSING AND PROPERTIES INDEX	
<p>2</p> <p>CO</p> <p>DETERMINATION OF SIZE AND CHARGE OF FOG DROPLETS. N. I. Petryanov. <i>Kolloid-Z.</i> 63, 171-4; <i>J. Phys. Chem.</i> (U. S. S. R.) 4, 667-72 (1953). The principle of the Wells and Gerke method (cf. C. A. 13, 624) was combined with that of Millikan-Rhrenhalt so that the charge and size were simultaneously obtained from photographs. Special precautions for good photographs are use of intensive illumination, careful adjustment of the system and photographic app., grounding of fog cones. The method is not applicable below 0.3 μ, where Brownian movement becomes too large, or above 40 μ, where Stokes' law fails, but which is above the limit for sizes found in fogs. A mineral oil fog droplets 1.2 to 2.0 μ, revealed in relation between size and charge.</p> <p>Arthur Fleischer</p>	<p>2</p>
<p>ASH-SLA METALLURGICAL LITERATURE CLASSIFICATION</p>	<p>RESEARCH DIVISION</p>

117 AND 118 INDEX		PROCESS AND PROPERTIES INDEX		119 AND 120 INDEX	
B-II-7					
<p>Microscopic method of detection of mineral oils in drying oils. H. F. Jones (J. Appl. Chem. Res., 1933, 6, 1180-1181). A solution of drying oil (I) with mineral oil (II) is obtained by allowing II (from expired oil) to condense on a small drop of dried (I), and examining the drop of condensed II, microscopically; the presence of (II) is indicated by characteristic lenticular globules floating on the surface. This method is applicable to (I) alone or in paint. R. T.</p>					
<p>ASTM-BLA METALLURGICAL LITERATURE CLASSIFICATION</p>					
117 AND 118 INDEX		119 AND 120 INDEX		119 AND 120 INDEX	
117 AND 118 INDEX		119 AND 120 INDEX		119 AND 120 INDEX	

1ST AND 2ND EDITIONS										PROCESSES AND PROPERTIES INDEX										3RD AND 4TH EDITIONS									
<div style="position: relative;"> <div style="position: absolute; top: 10px; left: 10px; font-size: 2em; font-weight: bold;">SA</div> <div style="position: absolute; top: 10px; right: 10px; font-size: 1.5em;">A-3</div> <div style="position: absolute; top: 200px; left: 250px;"> <p>5120. Activation Energy of Evaporation and Condensation. N. Fuchs. <i>Comptes Rendus de l'Acad. des Sciences, U.R.S.S.</i> 3, pp. 335-340, Aug. 13, 1954. In German.—It is suggested that the hypothesis of Miyamoto [see Abstract 4104 (1950)], according to which only those molecules whose vibrational energy exceeds a certain value can escape from or enter a solid or liquid surface, leads to a dependence of the potential energy of a molecule on its distance from the surface. This potential energy curve rises to a maximum of ϕ_0 above the surface and falls to a minimum E below the surface. ϕ_0 is the activation energy for condensation, and if ϕ_e is the activation energy for evaporation, then $\phi_e = \phi_0 + E$ where E is the heat of evaporation at absolute zero. The kinetic theory of evaporation shows that usually $\phi_e = E$, and $\phi_0 = 0$. Reference is then made to a number of experiments from which values of ϕ_0 might be derived. These include the condensation of silver and of mercury and the emission of electrons from a metal. Invariably the value obtained for ϕ_0 is zero or a very small quantity.</p> <p style="text-align: right;">R. W. P.</p> </div> </div>																													
A.S.T.M. METALLURGICAL LITERATURE CLASSIFICATION																													
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PRINCIPLES AND PROPERTIES INDEX																									
<p>SA</p> <p>273. Velocity of Evaporation of Small Drops in a Gaseous Atmosphere. N. Fuchs. <i>Phys. Zeits. d. Sowjetunion</i>, 6, 3, pp. 234-242, 1934. In German.—The rate of evaporation of fluid drops under different conditions is calculated theoretically, account being taken of a number of factors which had been neglected in the theory of Maxwell. The chief assumptions made are that the drops are spherical and are stationary relative to an atmosphere of infinite extent, that the vapour pressure of the fluid is negligible in comparison with the atmospheric pressure, that the vapour immediately surrounding the drop is saturated and that evaporation does not cause lowering of the temperature of the drop. Small corrections are derived which may be applied to the Maxwell theory to allow for the various factors mentioned. H. J. H. S.</p>																									
<p>ASA-SEA METALLURGICAL LITERATURE CLASSIFICATION</p>																									

1ST AND 2ND REVISED										3RD AND 4TH REVISED									
PROCESSES AND PROPERTIES INDEX																			
57										A54 d									
<p>4785. Formation of Aerosols. N. Fuchs and N. Oechman. <i>Acta Physicochimica</i>, 3. 1. pp. 61-78, 1956. In German.—A method is described for preparing and determining the structure of aerosols, depending on quickly mixing two air streams containing substances capable of reacting with one another, followed by immediate strong dilution. In this way the coagulation of the primary aerosol is substantially avoided. According to this method SO₂ and H₂O vapour (partial pressures of the order of 0.1 — 1 mm.) give a sulphuric acid mist, the reproduction of the particle concentration and also degree of dispersion of which are such as to be unattainable by the ordinary methods of aerosol production. The radius of the droplets (according to weight and particle concentration) is of the order of $1.5 - 1.8 \times 10^{-6}$ cm. It would appear accordingly that the mist is monodispersed.</p> <p style="text-align: right;">J. K.</p>																			
A18.15.1 METALLURGICAL LITERATURE CLASSIFICATION										6-377.2/28.1/28.2									
18000 51000 11000 12000 13000 14000 15000 16000 17000 18000										19000 20000 21000 22000 23000 24000 25000 26000 27000 28000									

The vapor pressure of small drops and crystals. A. Frumkin and N. Pyks. *Acta Physicochim. U. R. S. S. 3*, 783-80 (1945) (in German). A mol. kinetic equation, based on the classical capillarity theory of Kelvin for small liquid drops, was derived. For the case of very small, nonpolar crystals with simple cubic lattices, on the assumption that the attractive forces between the building stones of the lattice decrease with the 7th power of the distance, the correction to the Kelvin equation was calculated by the method of Katschew and Stranski (*ibid.* 28, 3443 and 7128). In the case considered, this equation gives the correct order of magnitude of the vapor pressure down to crystals of the smallest possible size. E. R. R.

ASB-SLA METALLURGICAL LITERATURE CLASSIFICATION

1ST AND 2ND QUANTITIES										3RD AND 4TH QUANTITIES									
PROCESSES AND PROPERTIES MODE																			
<div style="position: absolute; top: 10px; left: 10px; font-size: 2em;">BC</div> <div style="position: absolute; top: 10px; right: 10px; font-size: 2em;">a-1</div> <div style="position: absolute; top: 50%; left: 50%; transform: translate(-50%, -50%); text-align: center;"> <p>Effectiveness of the collisions of aerosol particles with solid walls. N. FUMS (Acta Physicochim. U.R.S.S., 1935, 3, 315-335). Ultra-microscopic observations indicate that 10-25% of the collisions of aerosol particles with a glass or metal wall appear to be ineffective but it is shown that particles approaching within 1 μ are counted as colliding, and that all actual collisions are effective.</p> <p>R. R</p> </div>										<div style="position: absolute; top: 50%; left: 50%; transform: translate(-50%, -50%); text-align: center;"> <p>ASS-51A METALLURGICAL LITERATURE CLASSIFICATION</p> </div>									
FROM SYNOPTIC										FROM SCHOLAR									
1930 1931 1932 1933 1934 1935 1936 1937 1938 1939										1940 1941 1942 1943 1944 1945 1946 1947 1948 1949									
1950 1951 1952 1953 1954 1955 1956 1957 1958 1959										1960 1961 1962 1963 1964 1965 1966 1967 1968 1969									

1ST AND 2ND COLUMNS		PROCESSES AND PROPERTIES INDEX		3RD AND 4TH COLUMNS	
BC		<p>Stability and charging of aerosols. II. Experimental. M. F. FOMIN and I. P. PETRIANOV (Acta Physicochim. U.S.S.R., 1955, 3, 827-838; cf. A., 1954, 668).—A method of unipolar charging of aerosols is described. The velocity of coagulation of such sols is $>$ that of uncharged sols although there is an apparent increase in the dispersion due to the more rapid coagulation of the larger, highly charged particles. The coagulation curve of the charged aerosol is approx. linear and the coagulation velocity approx. as the square of the mean particulate charge in accordance with theory. The stability of an aerosol with a higher charge is the same as that of the uncharged sol. R. S.</p>		C-1	
ASB-SLA METALLURGICAL LITERATURE CLASSIFICATION					
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12000 111000000		120000 111000000		120000 111000000	

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1ST AND 2ND CROSS

PROCESS AND PROPERTIES INDEX

3RD AND 4TH CROSS

COMMON ELEMENTS

COMMON PROPERTIES INDEX

COMMON

MATERIAL INDEX

450-514 METALLURGICAL LITERATURE CLASSIFICATION

SECOND SYMBOL

SECOND SET

3RD SET

SECTION

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2ND SET

3RD SET

4TH SET

5TH SET

6TH SET

7TH SET

8TH SET

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137 AND 140 ORDERS										140 AND 17H ORDERS									
PROCESSING AND PROPERTIES INDEX																			
<p><i>La</i></p> <p>2020. Rate of Fall of Large Particles. N. Fuchs. <i>Techn. Phys. U.S.S.R.</i> 3. 2. pp. 244-257, 1936. In German.—It is pointed out that using the relation between $C (= 2K/\rho\eta^2u^2)$ and $R (= 2\rho\eta u)$ apparent from the researches of the last 20 years—see <i>Handbuch der Experimental Physik Bd. IV. 2. p. 348</i>—in a short calculation based on the equality of the forces of gravity and hydrodynamic resistance K acting on a falling particle of density ρ, curves connecting τ and u be drawn for given values of ρ, η and η. As an example such curves are given for a particle of density $\rho = 10$ falling in air. This example shows that Stokes' law does not hold when the particle radius r exceeds 10μ.</p> <p>P. H. B.</p>										<p><i>A 53</i> <i>dd</i></p>									
<p>430-51A METALLURGICAL LITERATURE CLASSIFICATION</p>																			
<p>137 AND 140 ORDERS</p>										<p>140 AND 17H ORDERS</p>									
<p>137 AND 140 ORDERS</p>										<p>140 AND 17H ORDERS</p>									

1ST AND 2ND CHOICES										PROCESSES AND PROPERTIES INDEX										3RD AND 4TH CHOICES									
Common Elements										Common Elements										Common Elements									
Materials Index										Materials Index										Materials Index									
<p>BC</p> <p>Rate of charge of a droplet in an ionic field. N. Fuchs, I. PSTRANOV, and H. ROTZKE (Bull. Acad. Sci. U.R.S.S. 1938, 833-841).—The law govern- ing the rate of charge of droplets of radius 0.5μ is the same as that for particles of radius 3-4 mm. F. J. L.</p> <p>2-1</p>																													
A.S.C.-S.L.A. METALLURGICAL LITERATURE CLASSIFICATION																													
1ST AND 2ND CHOICES										3RD AND 4TH CHOICES										5TH AND 6TH CHOICES									
1ST AND 2ND CHOICES										3RD AND 4TH CHOICES										5TH AND 6TH CHOICES									

1ST AND 2ND ORDERS										3RD AND 4TH ORDERS									
PROCESSES AND PROPERTIES INDEX																			
<p>SA</p> <p style="text-align: right;">A 53 b</p> <p>1431. Microscopic Determination of the Size of Aerosol Particles. B. Retzsch and M. Fuchs. <i>Acta Physicochimica</i>, 5, 6, pp. 583-602, 1959. In German.—The size of the aerosol particles is measured in a Millikan condenser with a strong electric field, which causes the particles carrying known charges to migrate up and down with a great enough velocity to make the disturbances due to the Brownian motion negligible. For oil and sal-ammoniac aerosols the limiting radius is approximately 0.5 μ. The method is independent of the apparent density of aggregate particles in the smoke. Through quick mixing of an air current, bearing vapors, with a cold current for either mineral oil or sal-ammoniac, sub-microscopic particles are obtained. The particles in fine, freshly-made aerosols are usually evenly dispersed. H. M. B.</p>																			
<p>ASB-35A DETALLURGICAL LITERATURE CLASSIFICATION</p>																			

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Rate of fall of super-Stokesian particles. N. Fuks.
J. Tech. Phys. (U.S.S.R.) 6, 709-11 (1938). Theoretical.
Calculations are given for rate of fall of dust particles in air.
P. H. Rathmann

MATERIALS INDEX
OPEN

ASSOCIATED METALLURGICAL LITERATURE CLASSIFICATION

GROUPS
SUBGROUPS
SUBSUBGROUPS

CLASSIFICATION

RESEARCH AND DEVELOPMENT

BC

PROCESSING AND PROPERTIES INDEX

Estimation of drop-size in water clouds. N. FUCHS (Physikal. Z. Sovietunion, 1936, 10, 421—423).
 —The drops were collected on a glass plate covered with a mixture of vaseline and mineral oil (d 0.0).
 O. D. S.

ASB-SLA METALLURGICAL LITERATURE CLASSIFICATION

SUBJECTS										AUTHORS										TITLES									
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2096. Dispersivity of Aerosols. N. Fuchs. *Acta Physicochimica*,
O. S. pp. 143-160, 1937. In German.—A comparative survey, with refer-
ences, of existing methods applicable to mists, smokes, dusts, etc., classified
as follows (1) microscopic and macroscopic methods for determining
terminal velocities in electrical, gravitational and centrifugal fields, (2)
microscopic and macroscopic diffusion methods, (3) weighing methods
(as in sedimentation), (4) direct microscopy, (5) special optical methods
("corona," X-ray and electron diffraction, tyndallimetry). I. V. C.

ASAC 50.4 METALLURGICAL LITERATURE CLASSIFICATION